EXPERIMENTAL SCIENCES

Sandra RUIZ MARTINEZ

THEORY OF MULTIPLE INTELLIGENCES AND ITS APPLICATION TO A SCIENCES UNIT: LIVING THINGS

TFG/*GBL* 2013

upna Universidad Pública de Navarra
Nafarroako Unibertsitate Publikoa
Facultad de Ciencias Humanas y Sociales
Giza eta Gizarte Zientzien Fakultatea

Grado en Maestro de Educación Primaria /

Lehen Hezkuntzako Irakasleen Gradua

Grado en Maestro en Educación Primaria

Lehen Hezkuntzako Irakasleen Gradua

Trabajo Fin de Grado
Gradu Bukaerako Lana

THEORY OF MULTIPLE INTELLIGENCES AND ITS APPLICATION TO A SCIENCES UNIT: LIVING THINGS

Sandra RUIZ MARTINEZ

FACULTAD DE CIENCIAS HUMANAS Y SOCIALES
GIZA ETA GIZARTE ZIENTZIEN FAKULTATEA

UNIVERSIDAD PÚBLICA DE NAVARRA
NAFARROAKO UNIBERTSITATE PUBLIKO

Estudiante / Ikaslea
Sandra RUIZ MARTINEZ

Título / Izenburua
Theory of Multiple Intelligences and Its Application to a Sciences Subject: Living Things

Grado / Gradu
Grado en Maestro en Educación Primaria / Lehen Hezkuntzako Irakasleen Gradua

Centro / Ikastegia
Facultad de Ciencias Humanas y Sociales / Giza eta Gizarte Zientzien Fakultatea
Universidad Pública de Navarra / Nafarroako Unibertsitate Publikoa

Director-a / Zuzendaria
Maider PEREZ DE VILLAREAL

Departamento / Saila
Psicología y Pedagogía. Área de Ciencias experimentales / Psicologia eta Pedagogia. Zientzia esperimentalen arloa

Curso académico / Ikasturte akademikoa
2012/2013

Semestre / Seihilekoa
Primavera / Udaberria

Preámbulo

El Real Decreto 1393/2007, de 29 de octubre, modificado por el Real Decreto 861/2010, establece en el Capítulo III, dedicado a las enseñanzas oficiales de Grado, que "estas enseñanzas concluirán con la elaboración y defensa de un Trabajo Fin de Grado […] El Trabajo Fin de Grado tendrá entre 6 y 30 créditos, deberá realizarse en la fase final del plan de estudios y estar orientado a la evaluación de competencias asociadas al título".

El Grado en Maestro en Educación Primaria por la Universidad Pública de Navarra tiene una extensión de 12 ECTS, según la memoria del título verificada por la ANECA. El título está regido por la *Orden ECI/3857/2007, de 27 de diciembre, por la que se establecen los requisitos para la verificación de los títulos universitarios oficiales que habiliten para el ejercicio de la profesión de Maestro en Educación Primaria*; con la aplicación, con carácter subsidiario, del reglamento de Trabajos Fin de Grado, aprobado por el Consejo de Gobierno de la Universidad el 12 de marzo de 2013.

Todos los planes de estudios de Maestro en Educación Primaria se estructuran, según la Orden ECI/3857/2007, en tres grandes módulos: uno, *de formación básica*, donde se desarrollan los contenidos socio-psico-pedagógicos; otro, *didáctico y disciplinar*, que recoge los contenidos de las disciplinares y su didáctica; y, por último, *Practicum*, donde se describen las competencias que tendrán que adquirir los estudiantes del Grado en las prácticas escolares. En este último módulo, se enmarca el Trabajo Fin de Grado, que debe reflejar la formación adquirida a lo largo de todas las enseñanzas. Finalmente, dado que la Orden ECI/3857/2007 no concreta la distribución de los 240 ECTS necesarios para la obtención del Grado, las universidades tienen la facultad de determinar un número de créditos, estableciendo, en general, asignaturas de carácter optativo.

Así, en cumplimiento de la Orden ECI/3857/2007, es requisito necesario que en el Trabajo Fin de Grado el estudiante demuestre competencias relativas a los módulos de formación básica, didáctico-disciplinar y practicum, exigidas para todos los títulos universitarios oficiales que habiliten para el ejercicio de la profesión de Maestro en Educación Primaria.

En este trabajo, el módulo *de formación básica* correspondiente al área de psicología y pedagogía se concreta en las secciones *Background, Theoretical Framework, Development* y *Pedagogical, psychological or social implications at school* reflejadas en el índice. Estas secciones corresponden a todos los antecedentes históricos, psicológicos y pedagógicos del estudio de la inteligencia y más concretamente, de las inteligencias múltiples.

El módulo *didáctico y disciplinar* correspondiente al área de las ciencias experimentales se desarrolla en las secciones *Author's reasoned approach* y *Didactic proposal based on the MI* correspondientes. Este módulo pertenece al área de las ciencias experimentales, más en concreto, el estudio de la diversidad de los seres vivos y la pérdida de biodiversidad.

Asimismo, el módulo *practicum* nos ha permitido desarrollar las actividades diseñadas como ejemplo en las secciones *Author's reasoned approach* y *Didactic proposal based on the MI* del índice ya que se pudo observar el uso de las inteligencias múltiples en el aula durante los practicum V y VI en el colegio Hijas de Jesús de Pamplona.

Por último, el módulo *optativo* de mención en inglés se ve reflejado en todas las secciones del trabajo redactadas en inglés, que corresponden a los apartados: *Background, Theoretical Framework, Development, Pedagogical, psychological or social implications at school* y *Didactic proposal based on the MI* del índice.

Por otro lado, la Orden ECI/3857/2007 establece que al finalizar el Grado, los estudiantes deben haber adquirido el nivel C1 en lengua castellana. Por ello, para demostrar esta competencia lingüística, se redactan también en esta lengua los apartados: *Author's reasoned approach* and the *Conclusions,* así como el preceptivo resumen que aparece en el siguiente apartado.

Resumen

El objetivo de este trabajo es profundizar en la Teoría de las Inteligencias Múltiples de Howard Gardner y las posibilidades de aplicar esta teoría en las escuelas. Se inicia con el desarrollo del estudio de la inteligencia desde el punto de vista psicológico. Después continúa con la evolución de las inteligencias múltiples y su aplicación al ámbito educativo con las consecuencias asociadas a la misma. El tema utilizado para ilustrar el uso de las inteligencias múltiples en la escuela es la *diversidad de los seres vivos* y la *pérdida de biodiversidad,* que se refleja en la sección correspondiente del documento. Esta sección es un desarrollo de un ejemplo del uso que le podemos dar a la teoría de inteligencias múltiples en la escuela.

Palabras clave: Inteligencias Múltiples; Howard Gardner; Biodiversidad; Seres Vivos; Educación Primaria.

Abstract

The objective of this work is to deepen in Howard Gardner's Multiple Intelligences Theory and the possibilities of the application of this Theory at schools. It starts with the development of the study of the intelligence from a psychological point of view. Then it continues with the development of the MI intelligences and its application to the educational area with the implications associated to it. The topic used to illustrate the use of MI at school is the Diversity of Living Things and the Biodiversity Loss, which is reflected in the corresponding section of the paper. This section is a development of an example of the use that we can give to the MI Theory at school.

Keywords: Multiple Intelligences; Howard Gardner; Biodiversity; Living Things; Primary Education.

INDEX

INTRODUCTION, OBJECTIVES AND ISSUES

Our educative system has had not real changes since it was created. The most used learning method, since the beginning of the School Institution, has been the rote method through continuous repetition of specific contents in order to memorize the required data. From the school, it was intended that all students learned the same, in similar rates and with the same resources; and students have been assessed following the same pattern. Because of this way of organizing the education and cognition, students have been far from the true learning and it has generated problems in those who did not reach the results expected because they have a different way of learning and thinking which did not fit within the rigid rules of the education.

Nowadays, the education is living a moment of evolution, where teachers and experts in education are trying to find new ways to instruct students according to the actual society and the era of new technologies and to make most of the students succeed in their educational results. In this finding, the Theory of the Multiple Intelligences has appeared in scene, suggesting new goals and a new methodology to be applied. Because of these reasons this document tries to bring closer this theory, its origin and background. The first part of this work aims to explain the evolution of the studies of intelligence from a psychological point of view and then, it describes the application of the MI to the educational area.

Other of the main points of this document is the study of the Biodiversity at school and to show one of the multiple ways this theory can be applied in schools.

The topic of biodiversity is really important at this moment. There exists a global worry about the care of the biodiversity and the biodiversity loss. The Multiple Intelligences is a good way to concern students and settle the importance of taking measures to avoid the loss and abuse of biodiversity.

How could we make people aware of the necessity of taking care of biodiversity? And how could we teach our students the biodiversity of the Earth and how to care for it? This document has been made in order to answer these issues and also to help

teachers to know more about MI and to show how to introduce the students in the world of Multiple Intelligences.

1. BACKGROUND

1.1. Evolution of the study of the intelligence[1]

Franz Joseph Gall (9 March 1758, Tiefenbronn, Baden - 22 August 1828, Paris) was an anatomist and German physiologist, founder of the Phrenology. He believed the functions of the mind are in specific areas of the brain, and this influences the behavior; he also supposed the size of the skull is defined by the development of these parts. Paul Broca located the speech center in the brain in 1861, so it was proved that Gall was right when he said that there were specific areas for different functions in the brain.

On the other hand, the statement the development of the brain was related to the size of the skull was refuted when it was discovered that the thickness of the skull varies. Gall identified in the brain the grey matter as active tissue and the white matter as conductive tissue. Today the assertion that personality is related to the shape of the skull is not considered as a valid one.

During the 19th century the intelligence began to be studied more thoroughly and different discoveries from the human mind were done.

Paul Pierre Broca (Sainte-Foy la Grande, Bordeaux, June 28, 1824 - July 9, 1880) was a French physician, anatomist, and anthropologist. The studies made by Broca by which he became famous and a cornerstone in the history of medicine and neuroscience were those that ended in the discovery of the speech Center (now known as the area of drill bit, or third gyrus of the frontal lobe). He came to this discovery by studying the brains of aphasic patients (persons unable to speak) and showed for the first time that there is a relationship between brain injury and a specific cognitive deterioration.

Sir Francis Galton (16 February 1822 – 17 January 1911), was a polymath, with a broad spectrum of interests. Galton contributed to different areas of science such as psychology and biology.

Galton is considered the father of the differential psychology because he applied Darwin's theories to the area of individual differences in human capabilities from a

[1] See annex I and II on page 50 and 51.

biological and adaptive perspective through simple mental processes. This was diametrically opposed to the principles more widespread of Wundt. He also studied inheritance in intelligence through the study of the professional achievements of related people.

Wilhelm Maximilian Wundt (August 16, 1832 - August 31, 1920) was a physiologist, psychologist and philosopher. He developed the first laboratory of psychology, and, as a result, the category of science has been awarded to this area. He used the introspection (reflection on the thoughts) to study mental processes, the mental activity and the processes that form it.

Starting from this point, the psychological studies derived and focused more on investigating more horizontal aspects, as memory or learning.

At the beginning of 20th century psychological scientific studies focused on trying to measure intelligence. In France, in 1900, after enacting laws to regulate compulsory education, it was discovered that there were very different levels among students some of them having great difficulties to do their homework. Because of this, and to be able to identify pupils with problems, psychologists tried to find a way of developing some kind of diagnostic resource. Thanks to this resource they could be able to distinguish students who would succeed and those who would not do so, as well as those who needed special education.

Alfred Binet (Nice, July 8, 1857- Paris, October 18, 1911) was an educator, graphologist and French psychologist. He designed with Théodore Simon (Dijon, July 10, 1872 - Paris, 1961) a psychiatrist and also French psychologist; the *school performance prediction test*, and therefore he is recognized as one of the main figures of the differential psychology and psychometrics, from which subsequently developed what we now know as intelligence tests.

The purpose of this test was to facilitate the diagnosis of those students who required special education, and also to help the improvement of the children's education. The risk with this test was that it could come to be used as a mere way of classification rather than serve as a support for pupils with problems.

The number of correct answers determined the mental age of the subject. If it corresponded to their age range it was considered as a *normal* subject, if it was over it, it was *superior* and if it was below it was *lower*.

William Lewis Stern (April 29, 1871 - March 27, 1938) was a psychologist and German philosopher. He invented the concept of intelligence quotient, later used to develop the first tests of IQ, to score the test results, and to compare the results between them. This first test for the prediction of school performance was essential for psychometrics and differential psychology.

The results of these advances led to the concept, still valid nowadays, that intelligence can be quantified. From here it also develops the theory that at birth, people have a level of intelligence that can be measured and stays static for the most part of their life.

It follows that intelligence is innate and unchangeable, which is mainly due to the individual's genetic inheritance so that abilities and limitations of each person are given naturally and they can hardly change.

Lewis Madison Terman (15 January 1877, Johnson County (Indiana), was an American psychologist who followed the studies of Binet and Simon. He is mainly known for being a great diffuser of the intelligence test in the United States. (Stanford-Binet Intelligence scales). Terman was focused on demonstrating that the success of a subject, both school and professionally, can be deduced through the IQ.

From this point, in United States, intelligence tests were spread as a very important psychological tool. The tests were studied and improved so that you could know easily the coefficient of a person and compare the results with other subjects of the same age. Such was the success that the uses of these tests were standardized in a short period of time.

The standardization was such that IQ was transformed into one more of the people's personal characteristics, similar to their height or weight. This means that although the creator of the test was not looking for a one-dimensional view of intelligence, these test promoted this vision.

Despite the popularity obtained, these tests had also criticisms and detractors, which have survived to these days. People questioned whether the intelligence could be measured only with the factors that took into account the test, or could be also influenced by other factors such as educational, emotional, contextual or personal.
At this point we reach psychologists such as Thurstone and Guilford, who studied the intelligence in a more pluralistic way and more related to Gardner and his multiple intelligences theory.

Louis Leon Thurstone (29 may 1887, Chicago - 30 September 1955, Chapel Hill) was a pioneer in the area of the psychology because he created the *law of comparative judgment*. This law is a system of equations that measure or set of the stimuli. He also created the Thurstone`s scale for the measuring attitudes. For Thurstone the combination independent components of the intelligence, that results in an intellectual performance.

Applying his analysis on the intelligence tests results of different subjects, he identified seven factors, which he called primary skills: verbal fluency (remembering words); verbal comprehension (defining words); the spatial aptitude (recognize figures); the perceptual speed (detect similarities and differences); inductive reasoning (logical thinking); numerical aptitude and memory.

His contributions helped to improve the test of intelligence, personality and interests, etc. because he considered that intelligence is not due to a single factor.

These discoveries may be considered forerunners of the Multiple Intelligences of Gardner (MI).

Joy Paul Guilford (March 7, 1897, Markette - 26 November 1987, Los Angeles) is one of the forerunners of the MI of Gardner, as he says that intelligence is influenced by many factors. Especially, he divided these factors into three different: *operations*, which are the skills required to receive and produce information; the *contents*, which refer to ways of perceiving and learning; and *products*, which are the results of a mental operation to acquire some learning.

Cognitive science appears in the second half of the 20th century. This science studied how it was represented and transformed the information inside the brain and also the

mental processes that form part of the knowledge construction, how the evolution and the development of intelligence took place, and the influence that inheritance and environment have in this evolution. In other words, the psychologists that follow this tendency were interested in qualitative rather than quantitative aspects.

In this cognitive tendency era it is necessary to highlight the studies of Jean Piaget (1896-1980), considered as the most important cognitive psychology theoretician of our time.

He worked in the laboratory of Binet with Théodore Simon. Here he became interested in the errors children made on the tests, which led him to be considered as revealing the fact of seeing how was the reasoning of a child, more than the successes or failures of the answers that this child could obtain in the test. For Piaget the intelligence is similar to other characteristics of the human beings such as the language.

This work had the result of the elaboration of a detailed scheme of the development of intelligence from childhood to adolescence and the acquisition of skills or competencies. He identified five phases or stages in development through which all children pass by in the same order: Sensor-motor stage, pre-operational stage, concrete operations and formal operations.

He used different methods for studying the children: observation, description of what they made and the deduction of their thoughts. With this information he developed a method in which he paid attention to both, the reactions and the interests of the children.

Piaget's theory has received many criticisms by later researchers although he is one of the main representatives of the cognitive perspective. These researchers found that the results described by Piaget varied if you changed any of its factors:

One of the criticisms made to Piaget is that he had a limited view of the intelligence in which the evolution stopped in the adolescence. Other researchers have claimed that the evolution of intelligence could not stop at the adolescence stage and there might be more stadiums.

With respect to the four stages of development proposed by Piaget, some scientifics questioned the affirmation that all children had to pass through all the stages described in a compulsory way, and also said that he described the stages of development too rigidly.

Another of the criticisms that was made is that the extreme interest Piaget had about the universality of the mind made him not to appreciate the differences between individuals, from different cultures and also from the same culture.

Piaget was also criticized for his lack of interest in the influence that the context could have in the development of the intelligence. It was not relevant for him because, he claimed, the development could be more or less fast, but the characteristics of the species will always appear in the predicted order. Many researchers believe the importance the context have in the development of intelligence.

Finally, Piaget described a development focused only on a logical-mathematical intelligence, which was an error for many researchers. Many scientists, such as Gardner, assert the existence of multiple intelligences and argue that the development of a kind of intelligence does not need to be in the same range as the development of another.

Despite all this, Piaget's theory has been followed and developed by many scientifics who are known as neo-piagetians. Among them, the most prominent are Case and Fischer. They said that Piaget's theory presents certain deficiencies and, therefore, they had dedicated themselves to made modifications according to the criticism to Piaget, as for example: they admitted that Piaget focused only on certain uses of the mind and he did not paid attention to others so, his point of view was limited; they did not share the rigidity of the sequences of the stages, they admitted that there exist other levels. They studied various methods to determine the position in which a child was; for the followers of Piaget, the concept of intelligence is broader, and took into account social and emotional aspects.

From this moment, at the end of the 20th century, the term of intelligence varied; it was influenced by the development of new technologies, science and medicine, as well as studies in the areas of human psychology.

From the last fifty years to this time, there have arisen some psychological theories that claim that the tests are limited to a specific situation that is not real, with exercises limited in the way they are resolved. Another of the criticisms says that the experience or practice is not taken into account. The problem, for these psychologists, is that the test focused only on the results obtained, without taking into account other factors that could affect them.

These prospects look for the establishment of the basis of the differences in the intelligence of each person avoiding the use of tests or laboratory studies. To establish these bases the intelligence is related with other disciplines such as biology or education.

These studies include the theory of Multiple Intelligences of Gardner. In 1983, Howard Gardner proposed his theory of MI as a counterpoint to the vision of the intelligence that has been followed classically, which claims that intelligence is a unitary and unchanging characteristic.

The theory of Gardner says that there are several types of intelligence that act combined between them. Gardner defines the intelligence as the ability to solve problems, or to develop products, which are of great value to a particular context.

Gardner is based on different evidences from which he says that there are six different intelligences: *bodily-kinesthetic, spatial, linguistic, logical-mathematical, musical* and *personal* intelligences, which have been later extended to a total of eight, by dividing the *personal* one in *intrapersonal* and *interpersonal* intelligences besides adding the naturalist intelligence too.

From the work of Gardner, the American psychologist Daniel Goleman, has deepened and unveiled the concept of *emotional intelligence*, which joins Gardner's intelligences: *inter*- and *intrapersonal*.

Goleman's definition of *emotional intelligence* says that this intelligence is the ability to recognize, motivate and manage our own feelings, and the others. This intelligence is built around four different abilities: *knowledge of one's self*, *self-regulation*, *empathy*, and *relationship management*.

Robert J. Sternberg, an American teacher and psychologist who was born in 1949, has dedicated part of his life to the study of intelligence. This psychologist seeks to get a broader notion of the intelligence and to cover more areas related to the real world. He has published the *Triarchic Theory of Intelligence*. This theory was the first to go against the psychometric approach and adopt a more cognitive approach. In his theory Sternberg proposes three different types of intelligence: *analytical*, *creative* and *practical*, which are divided into three subtypes each one, that complement the others: *componential*, for the resolution of problems; *experiential*, which takes into account how the experience affects the intelligence; and *contextual*, that bears in mind the influence of the context.

The American psychologist Stephen J. Ceci, raised, at the beginning of the 1990s, the *Bio-Ecological Intelligence Treaty*, based on the theory of Sternberg. This psychologist delves more into the influence of the context and the importance it has to solve more complex problems. Ceci agreed with Gardner in terms of their approach to different types of intelligence.

Looking back and summing up, in the various theories that have been enacted throughout the, relatively short, story about the intelligence studies, there has been an evolution of the concept of intelligence, trying to understand this concept in a comprehensive manner, to be able to apply in the first instance this knowledge to the education and the development of people.

2. THEORETICAL FRAMEWORK

2.1. Foundation

Howard Gardner was part of a study group in Harvard, in 1979, which was studying about the potential of the human mind for the Bernard Van Leer Foundation in The Hague. From this research in 1983 Gardner formulated his theory of MI in his book *Frames of Mind.*

In his work, Gardner believes that the concept of intelligence has not been well reflected in the previous studies and theories linked to psychometrics. He considered

them limited to only certain skills. With his theory of MI, Gardner extends the concept of the mind to other important areas in the society not reflected in psychometric studies.

Gardner defines the intelligence as the ability to solve different problems and thereby, to obtain valuable products for real life. Because of this, he asserts there are different types of intelligence, a total of eight, which are: musical intelligence, bodily-kinesthetic intelligence, naturalistic intelligence, visual-spatial intelligence, logical-mathematical intelligence, interpersonal intelligence, intrapersonal intelligence, and linguistic intelligence. They are formulated to cover all human abilities, which have the same importance as the traditionally reflected in the test for him. These traditional abilities were amounted into two of his intelligences: the linguistic and logical-mathematical ones.

Gardner gives the same importance to each and every one of the defined intelligences in his theory. Therefore, instead of defining them as skills, he called them intelligences, with the intention of encouraging that all people can be considered intelligent one way or another: *"It is of utmost importance that we recognize and form the range of human intelligences and all combinations of intelligences. Everyone is different, in largely because we have different combinations of intelligences. If we recognize it, I think that at least we will have a better chance to properly handle the many problems we face in the world"*[2]

To define the different types of intelligence, Gardner performed various proofs that analyzed different sources, he did not rank the intelligences randomly, but each intelligence should fulfill his proofs to be considered as intelligence itself. To classify these intelligences Gardner established various criteria: Potential isolation by brain damage; the existence of “idiots savants”, prodigies and other exceptional individuals; a core operation or set of identifiable operations; a distinctive development history,

[2] ARMSTRONG, T. *Las inteligencias múltiples en el aula. Guía práctica para educadores (*2006, p. 15) *“Es de máxima importancia que reconozcamos y formemos la variedad de las inteligencias humanas, y todas las combinaciones de inteligencias. Todos somos diferentes, en gran parte porque tenemos distintas combinaciones de inteligencias. Si lo reconocemos, creo que por lo menos tendremos una mejor oportunidad para manejar de manera adecuada los muchos problemas que nos enfrentan en el mundo”*

along with a performance definable set of expert "end-state"; support of experimental psychological tasks; psychometric findings support; and susceptibility to encoding in a symbol system.[3]

- *Potential isolation by brain damage*: A brain injury can damage part of the brain where is located one of the intelligences' center, but the rest of them, which are located in other areas, may remain intact; from this facts, it follows that there is autonomy between different brain areas. An example would be an injury to the speech area, this injury can impair a person's ability to communicate orally or even read, but instead of it, he can perform mathematical calculations, produce music or play any sport. Gardner rests on this evidence to assert the existence of eight parts of the brain, one for each intelligence, which are independent from each other.
- *The existence of "idiots savants", prodigies and other exceptional individuals*. Within the same group of people, there exists a great variety of development in each intelligence, in terms of strengths and weaknesses. Gardner uses this variety to study different profiles on different people. A clear example would be the *"idiots savants",* which have a highly developed area, but in other areas their performance levels are very low.
- *A core operation or set of identified operations.* It is of great importance to identify the skills involved in each intelligence to locate the operational problems that a subject can have in a specific intelligence.
- *A distinctive development history, with a definable set of expert performance in a "final state"*. Each intelligence has a type of development and the evolution occurs differently, it could be in an earlier stage or, on the other hand, in a later stage, but all individuals pass through this development to reach a final development state, which may be higher or lower, depending on the stimulus received and each person's capabilities. These intelligences develop a role in the society, they are not isolated and they do not work in decontextualized situations.

[3] GARDNER, H. 1983. *Frames of Mind: The Theory of Multiple Intelligences;*
PRIETO SÁNCHEZ, M.D.; FERRÁNDIZ GARCÍA, C. 2001. *Inteligencias Múltiples y Curriculum Escolar*

- *An evolutionary history and a plausible evolution*. Intelligences do not only belong to current human beings, but can be seen in the homo-sapiens predecessors and even in different species, for example, in the communication between dolphins, whales or primates.
- *Support from experimental psychological tasks*. With this support the autonomy of the different intelligences can be demonstrated and even their different development that a kind of intelligence can has, depending on its interaction with other intelligences. In other words, we can use experimental psychological studies to prove the existence of multiple intelligences.
- *Support from psychometric findings*. Although Gardner is a detractor of the use of standard tests to measure intelligence, he says that they can be used to prove his theory of multiple intelligences, by observing the weak relationship between language and logical-mathematical skills, which are the skills measured in these kinds of tests.
- *Susceptibility to be encoded in a symbol system*. All intelligences have their own symbolic code.

Another important aspect of the theory of MI is that it is based on some principles which are: *"All individuals have the eight intelligences; most people can develop each intelligence to an adequate level of competence; intelligences usually work together in complex ways; there are many ways to be intelligent within each category."*[4]

- *All individuals have the eight intelligences*: All subjects have capabilities in all the intelligences but each one is developed differently in each person. This means that one or more types of intelligence may be highly developed but instead, others may be less developed. Therefore, each person has a development scheme, different from the rest, because they have different combinations of intelligence developments.

[4] ARMSTRONG, T. 2006. *Las inteligencias múltiples en el aula. Guía práctica para educadores* (p.31)*: "Todos los individuos poseen las ocho inteligencias; la mayoría de las personas pueden desarrollar cada inteligencia hasta un nivel adecuado de competencia; las inteligencias por lo general trabajan juntas de maneras complejas; hay muchas maneras de ser inteligentes dentro de cada categoría"*

- *Most people can develop each intelligence to an adequate level of competence*: Stimulating and working on the development of a particular intelligence can cause a satisfactory level of achievement in that intelligence in a singular person. This means that, with enough work, we can successfully develop all intelligences. The main difference we found in the development of intelligence between different people is that intelligences harmonize differently in different subjects.
- *Intelligences usually work together in complex ways*: In problem-solving situations in a real environment, the different intelligences interact with each other as long as there is no brain damage or the case of the "idiots savants", because in these cases one or more of the intelligences do not work in a normal way due to its situation or the damage that is suffered.
- *There are many ways to be intelligent within each category*: on the MI theory it is not sought a specific definition of the necessary characteristics to say if a person is intelligent or not. What it seeks is to clarify that, due to the existence of different areas of intelligence and depending on the various forms of development that can occur, it can be drawn that there is a wide variety of different intelligences in each category that do not adhere to a particular pattern.

2.2. Gardner's eight types of intelligences[5] [6]

To Gardner, the intelligences are not entities that can be verified in a physical way but are useful scientific elements to classify and describe the skills of people. These intelligences do not exist by themselves in real life, but it is needed to extrapolate them out of context in order to examine its main characteristics.

These are, briefly defined, the eight types of intelligence that Gardner postulates:

[5] ARMSTRONG, T. 2006. *Las inteligencias múltiples en el aula. Guía práctica para educadores;* GARDNER, H. 1995. *Inteligencias múltiples: la teoría en la práctica.*

[6] See annex III

- *Linguistic Intelligence*: It is the ability to use words effectively, orally or in writing. It includes the ability to manage the structure, meanings and practical uses of language.
- *Logical-mathematical Intelligence*: It is the capacity to use numbers effectively and to reason properly. It includes sensitivity to logical patterns and relationships, statements and propositions, functions and other related abstractions.
- *Visual-spatial Intelligence*: It is the ability to perceive the visual-spatial world accurately and to perform transformations on those perceptions. It incorporates the sensitivity to colour, line, shape, space and the relationships that exist between these elements, the ability to view visual or spatial ideas graphically and properly targeted.
- *Bodily-kinesthetic Intelligence*: It is the ability to control your own body in physical activities like sports, dance, crafts and even to express feelings and ideas. It includes specific physical skills, self-perceptual skills, the tactile perception and volume measures.
- *Musical Intelligence*: It is the capacity to perceive, discriminate, transform, and express musical forms. It includes the sensitivity to pitch, rhythm, timbre, melody or tone color of a musical piece.
- *Interpersonal Intelligence*: It is the ability to express and identify among people's moods, intentions, motivations and feelings. It includes sensitivity to facial expression and voice, the ability to distinguish between different types of interpersonal cues, and the ability to respond objectively to those signals.
- *Intrapersonal Intelligence*: It is the capacity for self-knowledge. It includes having a real image of yourself; know your own moods, intentions, motivations, personality and desires; and the capacity for self-discipline, self-esteem and self-understanding.
- *Naturalist Intelligence*: This is the last intelligence added by Gardner. It is the ability to perceive relationships between living organisms and recognizing the differences or similarities between them. It is specialized in identifying,

observing and classifying members of groups or species and breeds, being the area of investigation the observation of the natural world.

2.3. Relationship with the teaching practice[7]

Howard Gardner's intention when he published his theory of MI, was to increase the knowledge about the psychology of intelligence, but currently, it has had a greater influence in the educational area. After being published, it began to be developed in programs and schools based on the theory of Multiple Intelligences (as Project Spectrum or Montserrat School). As a theory developed to the area of psychology, there is no specific method of application to the educational area, so this is the reason why this theory has been applied in many different ways.

Teaching strategies for linguistic intelligence

The basic features of a student with an affinity towards the linguistic intelligence are that he shows a taste for reading, storytelling, writing, words... so, for this type of student the materials which have to be used would be: books, stories, magazines, debates, recorders, computers etc.

The work on this intelligence involves the development of oral and written skills in the students. The traditional strategies we used like textbooks, worksheets, readings ... are part of the resources we can use with this intelligence, but they are only a small part, because there are numerous resources apart from the traditional ones due to increase in the use of new technologies.

Here we show some examples of other helpful resources to work this intelligence:

- Storytelling: It is a way of transmitting knowledge, normally used in subjects such as language, but which can also be used in other subjects, for example, science.
- Brainstorming: This activity can be done to work with any subject. In this exercise the group's ideas are shared and analyzed to find the relationship between them for later use.

[7] See annex IV

- Recordings: It is focused on the development of the students' communicative skills. This resource can be used in interviews, audio-books and in order to work with information in general.
- Personal diary: It is a production that the students make about a topic previously chosen, and they have to work in it continuously for a period of time. This production may be shared only with the teacher or with the whole group.
- Publications: The use of school magazines or newspapers is a very useful resource when we want to work with the linguistic intelligence. The work of the students can also be bind like books and make them available to other students in the library.

Teaching strategies for logical-mathematical intelligence

Students who excel in this intelligence develop a taste for reasoning, experimentation, the logic, calculations... The strategies for developing this intelligence are from the area of heuristic and Socratic questions; calculations; classifications and scientific thinking.

The activities we can set to work logical-mathematical intelligence are, for example: problems, calculations, numerical games, etc... And the materials are, for example: calculators, and mathematical materials or games.

Some examples of activities are:

- Calculations and quantifications: The calculations do not have to bind only to the areas of mathematics and science. These activities can also be applied to any other subject using statistics, percentages...
- Classifications and categorizations: it consists on creating lists, classifications according to certain characteristics, using diagrams, time lines and mind maps. Using these tools in all the subjects allows the organization of ideas to work in a given topic.
- Socratic questions: Through different questions, the teacher draws the students' opinions, they reflect on the successes and failures of each one and they dialogue to reach an agreement.

- Heuristics: Some heuristic work examples are: To look for analogies, to split in different parts the problems, to propose solutions to approaches, to solve approaches from the back to the beginning, etc...
- Scientific thinking: This thought can be extracted from its usual area, which is the scientific, to the other subjects, and find its presence in other areas of knowledge.

Teaching strategies for visual-spatial intelligence

Those who have the visual-spatial intelligence more developed, learn more easily through images, with drawings, designing or visual resources. The resources used are visuals, movies, museums, the use of imagination...

To develop this intelligence we can use different types of activities such as mind maps, imaginative activities, and the use of visual and artistic resources. The teaching strategies that can be used to develop this intelligence need representations, definitions and manipulative and synthetic activities. Some of the materials which are useful for this development are: building sets, maps, plans, cameras, pictures…

These are some examples of activities to work with the visual-spatial intelligence:

- Display: The teacher can ask the students to imagine something about the subject they are studying, and then to describe it, discuss their opinions with their peers and draw the conclusions.
- Use of colour: Some colour signals can be used to facilitate the learning. These can be made with chalks on the blackboard, felt-pens, markers, paints ... the colours can also be used as a code, for example, link each color with a range of importance to mark their own materials.
- Graphical metaphors: It consists in linking concepts with images and even with other subjects studied, regarding the similarities or differences they may have.
- Sketches of ideas: This consists in making illustrations of the concept, or the most important concepts, of the subject they are studying; and to share their ideas with their peers. With this exercise they can greatly facilitate the understanding and the study of a subject.

- Graphical symbols: Making drawings on the board next to the explanation of a concept can be of great help in the general understanding of the concepts explained. The teacher can use the artwork as a tool to reach a wider range of students.

Teaching strategies for bodily-kinesthetic intelligence

Students who excel in this intelligence are very active in a bodily way. For example, those students who are constantly moving and like to dance, jump, run, play ... for these students we must work the physical expression, for example with theaters, representations, physical exercises and movements.

As they are very physically active students, the best strategy for working with this intelligence is to learn through the physical activity. The most suitable activities are, for example; sports, dances, and crafts. The materials needed for these exercises would be related with plasticine or clay crafts, sports equipment or costumes.

Here are some examples of these activities:

- Body replies: To convey their understanding they can make signs like: lifting thumbs if they understand what they are told, frown if they do not understand a concept or cross their arms when they disagree with something.
- Theatre in the class: We can make all kinds of plays and theaters about any information that is discussed in class. This can help many students to internalize their knowledge.
- Kinetic Concepts: Students can associate a gesture to the concepts studied in class, for example, when they read a text aloud, they would make gestures associated to significant terms each time they appear in a text.
- Manual Thinking: This is a traditional resource in which students learn through the manipulation of some materials.

Teaching strategies for musical intelligence

Students who excel in this intelligence are those who like to sing, hum, whistle or make rhythms. Therefore, the teaching strategies that can be used are those related to music.

Some good activities to reinforce this intelligence would be singing, playing instruments, or listening to music. Materials that can be used are songs, computers, videos or instruments.

Some examples of activities to do in class would be:

- Songs, raps and vocals: We can compose songs from the content that students study in a subject. Students can create rhythms and lyrics. The result can be recorded and posted on the school website or shown to other classmates.
- Musical memory: The content studied can be associated to a rhythm or a melody. This can help students to internalize the concepts. They can associate certain styles of music to certain topics.

Teaching strategies for interpersonal intelligence.

Children who have developed the intrapersonal intelligence are able to relate with others, they are fairly leaders in their relationships, they like being the center of attention and to call the shots in their activities. Thus, the activities that can be performed with these students are group activities, clubs and social events.

The class will be focused around cooperative learning, supporting and helping their fellows or participating in social support activities. The types of materials that can be used are costumes, board games or props.

The following examples could be used for interpersonal intelligence work:

- Share with colleagues: Sharing something with a partner, whether material or ideas is always a good resource when organizing a class. Students can share concepts, ideas, or even time. For this, they can be organized in work groups and they can do cooperative activities.
- Groups of cooperation: In a cooperative group, students can work together by sharing and discussing ideas to reach agreement, they can divide a class work into different parts and each one would be responsible for a part, depending on their preferences, or, for example, they could represent different roles and swap them between the members of the group in each different activity. These groups are very useful in teaching multiple intelligences, because the groups can include representative people of different intelligences.

- Table games: These games are opportunities for students to interact. These games can be contextualized in any subject. the students can even be asked to create their own rules for a game.

Teaching strategies for intrapersonal intelligence

People who have more developed the intrapersonal intelligence are independent, dreamy, self-demanding and reflective. These are people who need their personal space and time for their own meditation. They themselves set the pace of their learning.

To work with this intelligence, pupils must work individually and independently, with freedom to choose between different options in the subject studied. The materials that can be used are self-assessment materials or individual projects.

- Periods of a minute of reflection: This is a period of time that students can use to reflect and assimilate the knowledge they acquire. Children should think about what the teacher tells them. Their thoughts can be shared with the rest of the class or be kept for themselves.
- Personal relationships: This activity is good to relate the concepts that are discussed in class with reality, associate them with facts of their own life or of others' lives.
- Options: Students have the opportunity to choose and decide on their own education. They can choose activities, partners, projects, the topic they want to study or how they are going to do a class work.
- Feelings: A good strategy is to make children feel while they are learning, so it is important that the lessons have moments to laugh, cry, get angry or argue, in other words, they should have the opportunity to show their feelings.
- Set goals: Students with a more developed intrapersonal intelligence need to set goals. Therefore they must always have clear what purpose has each activity they do in class. Students can also be allowed to indicate what goal they want to achieve in any activity or to think about the goals they have in life.

Teaching strategies for the naturalist intelligence

Those students who excel in this intelligence would like to investigate, infer or experiment. Therefore, the methodology to be more akin to them is the contact with nature, have a class pet or caring for plants that are in the classroom.

Some activities that can be done to work this intelligence are experiments, observations, analysis and scientific materials such as microscopes. Here are some examples of activities:

- Nature walks: These activities can be applied to any subject. The observation and study of the nature and the environment are very useful for students to learn and prepare information content of a particular topic.
- Windows on learning: To use the window as a complement to learning is a very useful activity to foster the attention and observation in students.
- Plants in the classroom: Apart from using them as an ornament of the class, students can use plants and their care for the study different content, such as plants themselves, their care, to study the measures or percentages, or even the historical use that some plants have been given.
- Class Pet: This idea helps students to work the responsibility, the observation and to study the characteristics of different types of animals compared with their pet.
- Ecological study: The respect and care for the environment can be drawn from a purely scientific context to other subjects and content students have to learn.

2.4. Educational application of MI theory[8]

When the MI theory is applied to the classroom there are certain aspects to have into account. An example is the Decalogue list that was produced by Prieto and Ferrándiz[9]:

[8] See annex V

[9] PRIETO SÁNCHEZ, M.D. y FERRÁNDIZ GARCÍA, C. 2001. *Inteligencias Múltiples y Curriculum Escolar*. (p.60-61):

1. "*Informar qué son las inteligencias. Serie de mini-lecciones o actividades con el propósito de enseñar a los niños a conocerse intelectualmente.*
2. *Enseñar a utilizar todas las inteligencias. Se refiere a mostrar oportunidades variadas para que los niños usen todas las inteligencias.*

1. *To indicate what the intelligences are: They are series of mini-lessons or activities with the purpose of teaching children to know themselves intellectually.*
2. *To learn how to use all the intelligences: It refers to show varied opportunities for children to use all intelligences.*
3. *To learn how to work with multiple intelligences at once: It is to set spaces in the classroom (learning centers) that encourage students to learn how to interrelate all the skills of the various intelligences.*
4. *To involve parents in the education of intelligences: They can help children and teachers in the development of the different skills.*
5. *To consider the portfolio work: It consists on the evaluation of projects, materials and ideas submitted by children for each of the intelligences.*
6. *To implement the basic skills of the different intelligences in the curriculum content.*
7. *To include children's personal and social experiences in the classroom: Children can discuss the more relevant news and events that are occurring in the world.*
8. *To consider the different work styles: It consists on assessing the stylistic preferences of children. If they learn best singing, if they prefer to work alone or in groups or if they prefer to solve complex or simple problems.*

---

3. *Deben aprender cómo trabajar con varias inteligencias a la vez. Se trata de configurar espacios en el aula (centros de aprendizaje) que favorezcan que los alumnos aprendan a interrelacionar todas las habilidades de las distintas inteligencias.*
4. *Implicar a los padres en la enseñanza de las inteligencias. Éstos pueden ayudar a los niños y profesores en el desarrollo de las distintas habilidades.*
5. *Considerar los trabajos portfolio. Consiste en valorar los proyectos, los materiales y las ideas aportadas por los niños para cada una de las inteligencias.*
6. *Implementar las habilidades básicas de las diferentes inteligencias en los contenidos curriculares.*
7. *Incluir las vivencias personales y sociales de los niños en el aula. Los niños pueden comentar las noticias y los sucesos más relevantes que están ocurriendo.*
8. *Considerar los diferentes estilos de trabajo. Se trata de evaluar las preferencias estilísticas de los niños. Si aprenden mejor cantando, si prefieren trabajar solos o en grupo, si prefieren resolver problemas complejos, o sencillos.*
9. *Enseñar a los niños a transferir sus aprendizajes. Consiste en ayudarles a realizar conexiones entre todo lo aprendido en las diferentes áreas de aprendizaje, y que los apliquen más allá de la clase.*
10. *Enseñar a compartir los conocimientos y habilidades de las diferentes inteligencias. Es importante que los niños actúen de mediadores de sus compañeros"*

9. *Teaching children to transfer their learning: It is to help them to make connections between what they have learned in the different areas of knowledge, and to implement them beyond the classroom.*
10. *Teach to share the knowledge and skills of the different intelligences: It is important for children to act as mediators of their peers.*

Furthermore, these authors also suggest the existence of a series of steps[10] that can be used as a reference for the development and application of MI in the classroom:

Phase 1: Identify the strengths of children in different areas

Teachers should proceed to the identification of the strengths of the students through the observation, in order to assess the knowledge, skills and work styles in the classroom as a result of the experiences that students have.

Children, in their daily life, are not exposed to all the environments of the different intelligences, so it is convenient to introduce them to these environments in order to get used to them[11].

Teachers should identify the strengths of students based on their observations of their work and interests. If they follow a guide about the eight intelligences, teachers should be able to assess the skills of each student in the different areas of knowledge.

Having achieved the objective of identifying the strengths of the students, the teacher should use this information to enhance learning and motivate students.

Phase 2: Introducing children in the different learning areas

Teaching in the different learning areas is done by developing a variety of exercises that cover the entire area of knowledge of the eight intelligences, to get to convert the ordinary curriculum in a cognitive curriculum, including the intelligences that are not reflected in the regular one. For this, we must always consider the need to adapt the curriculum and activities that are designed based on it, to the characteristics and the context of the students.

[10] PRIETO, M. D. Y FERRÁNDIZ, C. 2001. *Inteligencias múltiples y curriculum escolar*
[11] See annex 6 on page 56

Everyone has the eight intelligences more or less developed, because of this, the activities should be varied in order to reinforce the areas related to the interests and abilities of students, and to encourage the development of those less worked areas.

Phase 3: Encourage the strongest areas of children and respect their diversity

Once the teacher has identified the strengths and highlighted areas of the students, he should make that the diversity enriches the classroom and students, to be capable of share their learning and knowledge.

The teacher should emphasize the development of the strengths of each student, but not just limited to them, but also he should use these strengths to reinforce and work the weaknesses that each student could have.

Phase 4: Take advantage of the strengths to develop other areas: The transference

This phase should teach students to take advantage of their strengths and use them in other areas of knowledge. This transfer can be done in several ways:

- Discovery learning helps students to discover their strengths, and the teacher should leverage this success to move to other areas in which the student does not stand out.
- To assess the learning style in which the student highlights. This style should be used by the teacher in order to make the student complete tasks in an area that he or she does not stand out.
- Detect the favourite area for the child can be very useful for attracting him to other activities that are not the areas of his choice.

Meaningful learning through the transfer is based on the mediation of the teacher in order to extract and model the strategies and skills used by students from one area and transferring them to other areas. This task requires time and effort by the teacher.

3. DEVELOPMENT

3.1. Historical or conceptual perspectives of origin of multiple intelligences

The educational system we currently have is an anachronistic system, because although it was designed during the Enlightenment and the Industrial Revolution, it still exists without having suffered relevant changes until today.

The educational system was designed to cope with the demands arising from the industrialization, summarized in obtaining workers and manpower with sufficient discipline to work in factories and able to perform a repetitive work during a prolonged period of time.

Because of this, we can still associate the method of the schools with the work in a factory, based on the repetition of memorized knowledge, to meet a strict timetable of entrance and exit, as well as a distribution of hours and subjects preset at school, the use of rings to change the class, rows to access and shift, using sealing defined subjects between which there is no relationship, differentiation of classes for ages and courses and even alphabetical order, etc.

Regarding to the intelligence, since the time of the Enlightenment, with this intellectual model which we have inherited, and consequently, also the current educational system, it is stated that there are intelligent people and others who, by nature, are not so intelligent. Intelligent people would be the ones getting good academic results and people who failed in this system would be those not smart enough.

This concept is today opposed to the idea which claims that intelligence is influenced also by the work that a person performs and, at the same time, the capacity to improve his/her abilities and knowledge. Because of this concept, many people who could have excelled in a scope have thought they were not smart enough to do it.

Knowledge and the subjects which were learned were those classified as useful for the labor and economic situation at that time. From this derives the core subjects of the school, which are Science, Mathematics, Language... inasmuch as they provided the knowledge necessary to function in the workplace.

On the other hand, the subjects related to creativity, expression and artistic development had a secondary role in the training of students. This subdivision has reached our days, which identifies some important subjects and others that are not so

important. As a result, students who have been able to stand out in any of the subjects considered to be little relevant have never considered those results as significant.

With the development of public education, it looked for a way to, objectively, effectively and in a quick way, clear up the skills and abilities of each person in order to be able to guide their education. The resource emerging for this was the intelligence test, through which one could classify the person in different ranges depending on its result, and, simultaneously, it allowed knowing who would supposedly be a successful or not successful person in life.

The test is based on decontextualized activities, mostly based on linguistic and mathematical knowledge. On many occasions, these activities from the tests are the same used when evaluating students at schools, such as gap-fill activities, choose the correct answer, etc. This is because in many countries, the intelligence tests have a very important role in the schools.

Summing up all the above information, the learning method that mainly has been used in schools, since its inception until practically today, is the rote method and the repetition. The school has always been based in a homogeneous, equal education for all students, and all students should learn at the same rate and with the same resources. This entailed also a homogeneous evaluation for all. This method has had a significant impact on the fact that, students turn aside from what we consider as true learning, and has created feelings of failure when the results were not the hoped or were not bright enough in the subjects considered most important.

From the moment in which the compulsory schooling arose, society has changed a great deal, and many theories about education and methodology have been developed, but the reality is that schools have hardly changed their way of proceeding.

One of the main features of the society, in which we currently find ourselves, is the speed at which it varies and evolves. This is the society of the information, and as such, due to how quickly it evolves, it requires new resources, requires creativity and imagination and the ability to innovate and to be original. This is the main reason why the educational system must evolve; it must adapt to the new times and set aside the

classical teaching methods which are not adapted to the present time, because they are based on the needs of the society of the past.

The reform required by the school must pursue the goal of achieving the success of all students depending on their characteristics and preferences. To use the student's strong points to reinforce those which are weaker.

The first thing the school should do is to recognize that students are heterogeneous, and each one has certain characteristics and skills which are different from the others. From here we can extract that each student learns and understands differently from their peers.

The school's approach should vary and seek the development and positive reinforcements needed by the student through their strengths. Because of this, school should focus more on the subject individually rather than see it as an element of a homogeneous group. It is necessary to encourage creativity, talent and taste for what we do, in order to achieve a greater and better development.

For these same reasons there is a need to adapt curricula so that instead of being so extensive they became more accurate when it comes to deepen in the knowledge that students acquire, so that instead of memorizing, they pass to develop a knowledge of contents based on the own concepts that reaches the subject through his or her own reflection, the development of the critical capacity and the imagination. While all of this, it is also necessary to modify the way to evaluate these concepts, taking into account the student and his/her mates in their own assessment rather than relying only on the results of the tests they carry out during their learning.

It is at this point when the theory of Multiple Intelligences (MI), by Howard Gardner, fits perfectly to achieve the goal to make the school evolve towards the current social situation.

Intelligence and everything that entails always have been interesting; it has been a subject of study and, of course, controversy. Due to the complexity involved in the concept of intelligence there has never been a definition with what everyone has agreed, so it has not reached to a consensus on it yet.

The first person to use the concept of intelligence was Cicero, and he did so with the aim of defining the ability to understand. The word "intelligence" comes from the Latin word *intellegentia*, which comes from another compound word: *intellegere*; inter, between and *legere*; read and choose. So from its etymological way, we can deduce that this definition of intelligence would have to do with the ability to reason, choose the best in a given situation.

The theory of multiple intelligences (MI) says the coexistence of different types of intelligence in the same subject. What this theory proposes is a custom education in which the different intelligences the subject stands out can strengthen the rest of intelligences, extrapolating the characteristics of the main intelligences to the less developed ones. Draw a single profile through which the learning is organized with a self-paced and according to the personal characteristics of each one.

The main function of education should be to search what our talent is, what kind of intelligence we have, and from there, to develop our learning according to the personal conditions of each person. We must find "*the area where our capabilities and desires with reality converge. When you reach it, the music of the universe resonates in you, a feeling that we are all called.*"[12]

Traditionally, the idea of intelligence was linked with the ability of a subject to establish and maintain social ties in their community. The intelligent person had notions about the main topics of his society, and this knowledge was a result of the experiences. Hence the consideration of the elderly as wise arises.

As society evolved and the industrial activity was developed, science and technology passed to relate the intelligent person as the person that grows this development in a useful way, such as language and mathematics skills.

From these facts we can deduce that the intelligence is associated with those who have useful capabilities for the development of the society in which they live.

[12] La Vanguardia, Sir Ken Robinson interview: “la zona donde convergen nuestras capacidades y deseos con la realidad. Cuando la alcanzas, la música del universo resuena en ti, una sensación a la que todos estamos llamados.”

4. IMPLICATIONS AT SCHOOL

An example of a school that works with the Theory of Multiple Intelligences is the project of the Key School in Indianapolis. In this school it is sought that students stimulate all the intelligences daily. For example, children have the opportunity to attend a "flow room" where they work at their own pace about their own interests. They also have inter-level classrooms in which students are grouped according to their common interests.

Other centers that have adapted this theory to practice are the Campbell Learning Centers in Seattle. In these centers they have the classroom space divided into different parts, each one dedicated to different intelligence. Students pass through each of these corners in a periodical way.

What all the experiences that have implemented the theory of multiple intelligences have in common is that they are based on personalized and individual education, which seeks for the student learning.

From this we can deduce that this view is opposed to the traditional one, which looks for the same treatment for all students, all of them learn the same subjects with the same method and they are evaluated in the same way.

Applying the Multiple Intelligences in the classroom has an impact on all the components of the school, teachers and the school itself, parents and students.

The schools that follow this methodology are more effective schools, they are focused on the development of the intelligence and the thought; from the MI model it is sought the promotion of the success and to reduce the school failure; they are in favor of inclusive classrooms in which all intelligences interact and the different ways of learning that exist; they encourage cooperative learning and they create communication channels which are more varied and better than in other methodologies, and they have a further collaboration among the members of the educational community.

Teachers using the MI Theory as their basis for teaching, help to create a meaningful and functional learning from the potential of the students, their personal characteristics, interests and needs; they use materials to teach students how to learn

with all the intelligences using all the possible channels to process the information through different strategies and resources.

From the theory of MI, all information that can be obtained from parents about the characteristics and interests of their children is vital, as well as their collaboration in different activities and projects.

It is wanted to encourage the curiosity to investigate and find different solutions to school problems and also real life in students. It is encouraged the divergent and flexible thinking to solve problems and to develop the organizational skills and metacognitive knowledge.

From this perspective it is questioned the value of the common curriculum, designed with content that all students should know. Gardner proposes a further adaptation of the curriculum and teaching-learning process: not everyone has the same capabilities, not everyone learns the same way and no one can learn everything.

Therefore teachers should leave the idea of Intelligence as a single entity that has a greater or lesser extent and cannot be modified. In the same way, psychologists and pedagogues should stop having the IQ as unique reference to assess cognitive ability, or the intelligence of the student, and begin to consider more qualitative and contextualized measures and assessments.

Whenever you want to introduce a new approach, method, procedure or a new experience in any area, it is complicated and the process of adaptation in the educational practice is slow and could take years.

Professionals of education should study the theory in order to think about it, and from their study and analysis they should determine whether this theory is applicable to their particular educational context.

It is clear that in the theory of Multiple Intelligences, the theory should be used as a means, not as a goal in itself. Teachers must specify what is the purpose of their educational practices, which are the “why” and “wherefore” of the education and to think about “how” and “what extent” the theory can contribute to the development of their purposes.

The main thing of it, it is to use the theory to the development and achievement of the purposes and principles that promote the integral development of the students:

- The basic purpose of any education system and of every teacher and institution can be specified fundamentally in three concepts:
  - The transmission of information and cultural knowledge.
  - The development of creativity in all its aspects and in all areas.
  - Personal growth and socialization of the subject.
- Develop team strategies and collaboration among teachers. This approach can be specified in different activities, such as:
  - In the training by creating working groups in which teachers must discuss debate and ponder over the theory to support a variety of opinions and mutual enrichment.
  - In the design of a stimulating environment in the school and the classroom to encourage the development of experience to work and strength the different intelligences.
  - To propose varied and contextualized activities taken from other projects such as the Spectrum project.
- Implement changes according to the culture of the school center. Any incorporation of some innovation or focus in school must be done from a context analysis from the centre, available resources and student diversity.

In a school using the methodology of Multiple Intelligences, it is a fundamental condition for its application and development. Before starting the application, the theoretical model has to be studied and to ponder on about the principles on which they base their daily teaching practices.

The study of the theory and the reflection on the objectives of their daily activities in the classroom, make teachers know if the theory fits in the school and social context in which they want to apply this method.

On the one hand, the teacher's education and training is one of the factors that influence the success of integrating a model based on the theory and, on the other

hand, the implementation of various projects based on this theory in different educational contexts also influences.

The family is one of the key points that must be taken into account when developing a methodology based on the MI.

The coordination between the school and the family can be made through different types of relationships:

- Participation and collaboration in the management and organization of the school curriculum or activities.
- Information, guidance and advice to parents through different procedures.
- Parents' training.

It is very important to have a means of communication between teachers and parents such as interviews, individual and group meetings or informal contacts at the entrances and exits to exchange information about the student. This will allow teachers to know and assess in more detail the characteristics of students, their interests, needs, and limits to establish common action guidelines between the school and home.

If it is intended to make any kind of innovation in terms of the methodology followed in the school, parents should be informed and they need to know the lines of work and the new methodological proposals that will be developed in the center for the education and development of their children. In order to implement projects based on the MI it is essential that parents have the means to be trained for their cooperation.

The application of MI theory in the practice has as consequence, some significant educational implications and changes related to the evaluation and teaching of different intelligences.

In short, this is translated into assessing the needs of the students within the natural classroom context, highlighting the strengths and helping them through these strengths to reinforce those points in which students are weaker. It is a continuous assessment based on multiple activities, procedures and adapted materials according to the type of intelligence.

With regard to education, the theory of MI involves major changes in the way we work with students and the learning process thereof. The MI theory has been an important step in the consideration of the nature and quality of the individual differences, in the type and grade of the different intelligences, and the search for methods and instructional strategies to enhance them.

Gardner proposes that any discipline or topic can be approached in at least five different ways: through the narrative, the logical analysis, the hands-on experience, the artistic expression, the exploration and philosophical analysis, the participation and the interpersonal and intrapersonal experience, meaning that school education may arise in different ways and by different and varied procedures.

5. AUTHOR'S REASONED APPROACH (SPANISH)

En el actual currículo que regula la enseñanza en educación primaria en Navarra se establece que la enseñanza se debe realizar en base a distintas competencias básicas que los alumnos deben desarrollar a lo largo de su formación. Estas competencias son las siguientes:

- Competencia en comunicación lingüística
- Tratamiento de la información y competencia digital
- Competencia cultural y artística
- Competencia matemática
- Competencia para aprender a aprender
- Competencia en el conocimiento y la interacción con el mundo físico
- Competencia social y ciudadana
- Autonomía e iniciativa personal

Si prestamos atención a estas competencias podemos ver claramente que cada una de ellas se corresponde con las ocho inteligencias que Gardner afirma que todos tenemos en su teoría de las inteligencias múltiples, desarrolladas en mayor o menor medida:

La competencia en comunicación lingüística correspondería a la inteligencia lingüística.; la competencia cultural y artística se identificaría con las inteligencias

musical y espacial; la competencia matemática se relacionaría directamente con la inteligencia lógico-matemática; la competencia para aprender a aprender abarcaría las inteligencias intra- e interpersonal; la competencia en el conocimiento y la interacción con el mundo físico tendría que ver con la inteligencia naturalista; la competencia social y ciudadana sería afín a la competencia interpersonal; la autonomía e iniciativa personal se relacionaría con la inteligencia intrapersonal y por último, el tratamiento de la información y competencia digital abarcaría las inteligencias lingüística y lógico-matemática.

Una vez establecidas estas relaciones no parece tan extraño el poder aplicar una teoría desarrollada en el ámbito plenamente psicológico al campo de la educación.

Teniendo en cuenta el DECRETO FORAL 24/2007, de 19 de marzo, por el que se establece el currículo de las enseñanzas de Educación Primaria en la Comunidad Foral de Navarra, en el que se expresan literalmente los siguientes principios:

- *"Una educación de calidad que atienda a la diversidad de todo el alumnado y responda a sus distintas necesidades, identificándolas desde las edades tempranas.*
- *Un proceso de enseñanza dirigido a que el alumnado adquiera las habilidades necesarias para aprender de forma autónoma, utilizando las fuentes tradicionales de información y las Nuevas Tecnologías.*
- *El desarrollo de las competencias básicas a través de todas las áreas del currículo.*
- *El tratamiento de la lectura comprensiva, la escritura y la expresión oral a través del aprendizaje de todas las áreas de las diversas etapas.*
- *La coordinación de las áreas lingüísticas del currículo a través tratamiento integrado de las lenguas.*
- *La coordinación entre las etapas educativas para garantizar la cohesión del aprendizaje del alumnado en cuanto a la adquisición de los objetivos de la etapa y de las competencias básicas.*
- *La peculiaridad lingüística de Navarra a través de los diferentes modelos lingüísticos de todas las etapas.*

- *El conocimiento de la diversidad geográfica, histórica y cultural de Navarra, el respeto a sus diferencias y la valoración de su patrimonio natural y artístico.*
- *El uso responsable de los recursos naturales, el cuidado del medio ambiente, la protección de la salud individual y colectiva, el consumo responsable y el respeto a las normas de tráfico.*
- *El fomento de los siguientes valores educativos: el conocimiento de sí mismo, la autoestima, el control emocional, la perseverancia, la capacidad de aprender de los errores y de asumir riesgos.*
- *El desarrollo de la capacidad de imaginar, emprender, realizar y evaluar proyectos individuales o colectivos con creatividad, confianza, responsabilidad y sentido crítico.*
- *La convivencia y los conflictos a través de los valores y prácticas democráticas basadas en el respeto mutuo.*
- *El desarrollo de actitudes contrarias a la violencia, el fomento de la igualdad de hombre y mujer y el acercamiento y respeto a las diferentes culturas desde todos los ámbitos escolares.*
- *La evaluación, tanto interna como externa, para detectar los puntos fuertes y las áreas de mejora.*
- *La biblioteca escolar como centro de recursos organizado, en todo tipo de soporte, que apoye el aprendizaje de todas las áreas del currículo y fomente la lectura.*
- *La cooperación de los centros escolares con las familias, especialmente con aquellas que, por motivos diversos, necesitan mayor apoyo.*
- *El fomento del clima positivo y cooperativo entre todos los miembros de la comunidad educativa.*
- *El reconocimiento social del profesorado, la valoración de su trabajo y la defensa de su autoridad en el ejercicio de su tarea diaria en el aula y en el centro.*"[13]

Podemos observar que estos cohesionan perfectamente con los principios fundamentales de las Inteligencias Múltiples, que hablan, igualmente, de buscar un

[13] DECRETO FORAL 24/2007, de 19 de marzo

desarrollo integral del alumno, pero en el caso de las IM, a través de las distintas inteligencias.

Más específicamente, si nos centramos en el área de conocimiento del medio natural y social, y concretamente, en el estudio de los seres vivos y la biodiversidad, que es la que nos compete en este trabajo, podemos observar que varios de los objetivos generales de esta área se adaptan al trabajo con las inteligencias múltiples:

- *"Comprender y expresar correctamente, en forma oral y escrita, los textos científicos, históricos y geográficos adecuados a su edad. Utilizar adecuadamente y con precisión el vocabulario específico del área.*
- *Identificar los principales elementos del entorno natural, social y cultural, analizando su organización, sus características e interacciones y progresando en el dominio de ámbitos espaciales cada vez más complejos.*
- *Reconocer la identidad geográfica, histórica, cultural y artística de Navarra y valorar la riqueza de su diversidad.*
- *Participar en actividades de grupo adoptando un comportamiento responsable, constructivo y solidario, respetando los principios básicos del funcionamiento democrático.*
- *Reconocer y apreciar la pertenencia a grupos sociales y culturales con características propias, valorando las diferencias con otros grupos y la necesidad del respeto a los Derechos Humanos.*
- *Analizar algunas manifestaciones de la intervención humana en el medio, valorándola críticamente y adoptando un comportamiento en la vida cotidiana de defensa y recuperación del equilibrio ecológico y de conservación del patrimonio cultural.*
- *Interpretar, expresar y representar hechos, conceptos y procesos del medio natural, social y cultural mediante códigos numéricos, gráficos, cartográficos y otros.*
- *Identificar, plantearse y resolver interrogantes y problemas relacionados con elementos significativos del entorno, utilizando estrategias de búsqueda y tratamiento de la información, formulación de conjeturas, puesta a prueba de*

las mismas, exploración de soluciones alternativas y reflexión sobre el propio proceso de aprendizaje.

- *Planificar y realizar proyectos, dispositivos y aparatos sencillos con una finalidad previamente establecida, utilizando el conocimiento de las propiedades elementales de algunos materiales, sustancias y objetos"* [14]

Por estas asociaciones y rasgos en común, la teoría de las inteligencias múltiples es un modelo aplicable a la enseñanza en educación primaria. El aplicar este modelo en un centro escolar implica muchos cambios en el funcionamiento interno del centro.

Durante el desarrollo del Practicum VI he podido observar la aplicación de esta metodología puesto que en el centro escolar en el que he desarrollado este módulo práctico (Colegio Hijas de Jesús de Pamplona), se encuentran actualmente adaptando la teoría de las IM a su enseñanza en los diferentes ciclos de educación primaria.

Al encontrarse en las primeras fases de adaptación al método, he podido apreciar las diferencias que existen con los métodos tradicionales y, a su vez, los problemas que surgen conforme van avanzando en la aplicación de esta metodología.

Hoy en día todavía no aplican la teoría de las inteligencias múltiples en el cien por cien de los temas ya que requiere mucho tiempo preparar todos los materiales y coordinarse entre todos los ciclos. Lo que van haciendo por el momento es diseñar proyectos para algunos de los temas que estudian los niños para, de esta manera, poder ir acumulando materiales año tras año hasta poder implementar completamente esta teoría.

En mi experiencia he tenido la oportunidad de participar en el diseño y desarrollo de un tema que sigue el método de las inteligencias múltiples. Este tema formaba parte de la asignatura de "Sciences", en concreto, el tema era sobre el universo.

El resultado de esta experiencia en el aula no podía haber sido mejor. Los alumnos realizaron distintas actividades relacionadas con el tema del universo que abarcaban las distintas inteligencias. Al acabar con el proyecto he podido concluir que los alumnos han aprendido los conceptos que tenía como objetivo el tema, y que, además han disfrutado haciéndolo. Algunos han disfrutado más con un tipo de actividad y

[14] CURRÍCULO NAVARRO DE CONOCIMIENTO DEL MEDIO NATURAL Y SOCIAL

otros con otro tipo. Esto se debe a que, tal y como indica Gardner, los alumnos tienen más desarrolladas unas inteligencias que otras.

Esta experiencia es la que me ha empujado a realizar este proyecto a cerca de las inteligencias múltiples y el área de conocimiento del medio. Lamentablemente, el periodo de prácticas ha terminado antes de poder tener tiempo para diseñar el tema de este trabajo, la diversidad de los seres vivos, y realizar un estudio empírico con los alumnos del centro.

Por esto, en este trabajo voy a presentar un plan de trabajo basado en las inteligencias múltiples y el estudio de los seres vivos como ejemplo de diseño de un tema siguiendo esta metodología.

El área de conocimiento del medio, y más concretamente de las ciencias naturales es un área que se puede trasladar perfectamente a la aplicación de las Inteligencias Múltiples. La inteligencia predominante en esta área es la naturalista, así con los alumnos que tengan esta inteligencia más desarrollada tendremos que trabajar para que sus éxitos en actividades dirigidas a esta inteligencia sean extrapolados y usados como apoyo para desarrollar el resto de las inteligencias.

En cambio, para aquellos alumnos cuyo punto fuerte no sea la inteligencia naturalista, al diseñar actividades dirigidas también hacia las demás inteligencias trabajaremos en la misma línea para que, con los logros en las inteligencias que tengan más desarrolladas, se puedan reforzar aquellas que lo están menos.

6. DIDACTIC PROPOSAL BASED ON THE MI

This didactic proposal is designed to use in third cycle of primary education.

- **Contents:**
  - *Block 1. The environment and its conservation*
    - Humans as components of the environment and its ability to act on nature.
  - *Block 2. The diversity of living things*

- The structure and physiology of plants.
- Use of keys and identification guides of animals and plants.
- Observing and recording of any process associated with the life of living things. To develop the oral and written communication with the results.
- Basic structure of the cell. To use the stereomicroscope and other technological means for recognition.
- Approach to other life forms: bacteria, viruses, algae and fungi.
- Finding information about living beings and their living conditions.
- Sensitivity for precision and rigor in observation of animals and plants and the development of the related work.
- Respect for rules and safety use of the tools and working materials.

- **Methodology:**

The methodology used in these activities follows the theory of Multiple Intelligences; hence activities are designed to work the topic with the different intelligences so we can adapt it to the different learning styles that may be in the classroom. These activities are designed as an example to work in the classroom with the theory of MI.

The activities are designed based on the primary education curriculum and includes some of the areas of the Environment Conservation and the Diversity of Living Things. In the design of these activities it is tried to work in a fun way to achieve the topic of global biodiversity and the necessary care to preserve and prevent the Loss of Biodiversity.

The main idea that leads all these activities is a research in which students help Geronimo Stilton (a cartoon character which is very close to them) to make an investigation. With the help of this character, students will discover the five Living Things Kingdoms, their main characteristics and the necessary care for their preservation.

- **Didactic unit**

"The mystery of living things"

Figure 1: Geronimo Stilton's team

Teacher**:** *"Can you see these people? Yes!!! They are Geronimo Stilton's team and we are going to help them to solve some mysteries about our new topic: The living things, because there is something happening with the living things… Do you know anything about it?"*

Activity 1: Brainstorming

- *Intelligence*: Interpersonal intelligence
- *Didactic objective:* Assess the students' previous knowledge about the topic and introduce the new information.
- *Development:*

The teacher asks the students about what they know about the living things. Surely they are going to answer things they have studied other years like animals, plants, vertebrates, invertebrates… the teacher should use this information to direct the conversation to the five Living Things Kingdoms:

Teacher: *"There is a mystery surrounding the Living Things in the Earth, there is a really old story which says there is a special classification for the living things. Geronimo*

needs this information for his investigation so we are going to use the Internet to find this classification".

Activity 2: Different Kingdoms

- *Intelligence*: Naturalistic / Intrapersonal / Interpersonal intelligences
- *Didactic objective:* Use the new technologies to learn the classification of the Living Things.
- *Development:*

In the computers room the children would work individually in order to find out the classification of the five kingdoms. The teacher should guide the investigation and help them if they find any trouble. It is probable that they would find something like this:

Figure 2: Five kingdom scheme

Once they find the classification, they would put in common what they have found. Then the teacher should divide them in five different groups and each group should investigate one of the kingdoms. Here the teacher would support them in their investigation again. To have further information they can visit this webpage: http://sciencegames.4you4free.com/five_kingdoms.html

Children should extract the main information of the Kingdoms and keep it to use it in other activity.

Activity 3: Story

- *Intelligence*: Linguistic intelligence / Interpersonal intelligence
- *Didactic objective*: To put in common the information found in activity 2
- *Development*:

With the information they have found in Activity 2, the five groups should write a short story about their Kingdom giving some examples to illustrate it.

Once they have done this story, they would tell it to the rest of the class.

Activity 4: Microscope

- *Intelligence*: Naturalistic / Intrapersonal / Interpersonal intelligences
- *Didactic objective*: Use scientific tools to investigate the Living Things
- *Development:*

Probably the students would have doubts about two of the Kingdoms: *monera* (*bacteria*) and *protista* (*algae*). It is sure that they have never seen any real examples of these two Kingdoms. Because of this, the teacher should go with the students to the laboratory classroom. There they would use the microscope to observe some *algae* and *bacteria* samples:

Figure 3: Monera (bacteria)

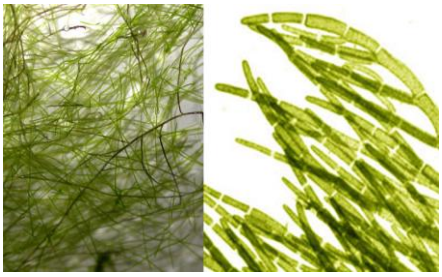


Figure 4: Protista (algae)

Activity 5: Puzzle-Poster

- *Intelligence*: Visual-spatial intelligence / Interpersonal intelligence
- *Didactic objective*: Create a poster to learn the main characteristics of the five Kingdoms.
- *Development*:

The teacher would explain the students the activity:

Teacher: *"We have investigated the five Living Things Kingdoms; this information is going to be very useful to Geronimo. But to put in order all this information we are going to create a puzzle-poster with all the important things we have learnt".*

After this, each group would make a big puzzle piece with the information of their Kingdom. At the end of the activity they should have a big puzzle with the five Kingdoms.

Activity 6: Cmap

- *Intelligence*: Logical-mathematical intelligence / Intrapersonal intelligence
- *Didactic objective*: Learn to extract the main information of a topic and put it in a mind map
- *Development:*

Before going to the computers room, the teacher should explain the students what a mind map is and how they can use the CmapTools program. Then they would go to the computers room and work individually in their Cmap about the five Kingdoms. This is an example:

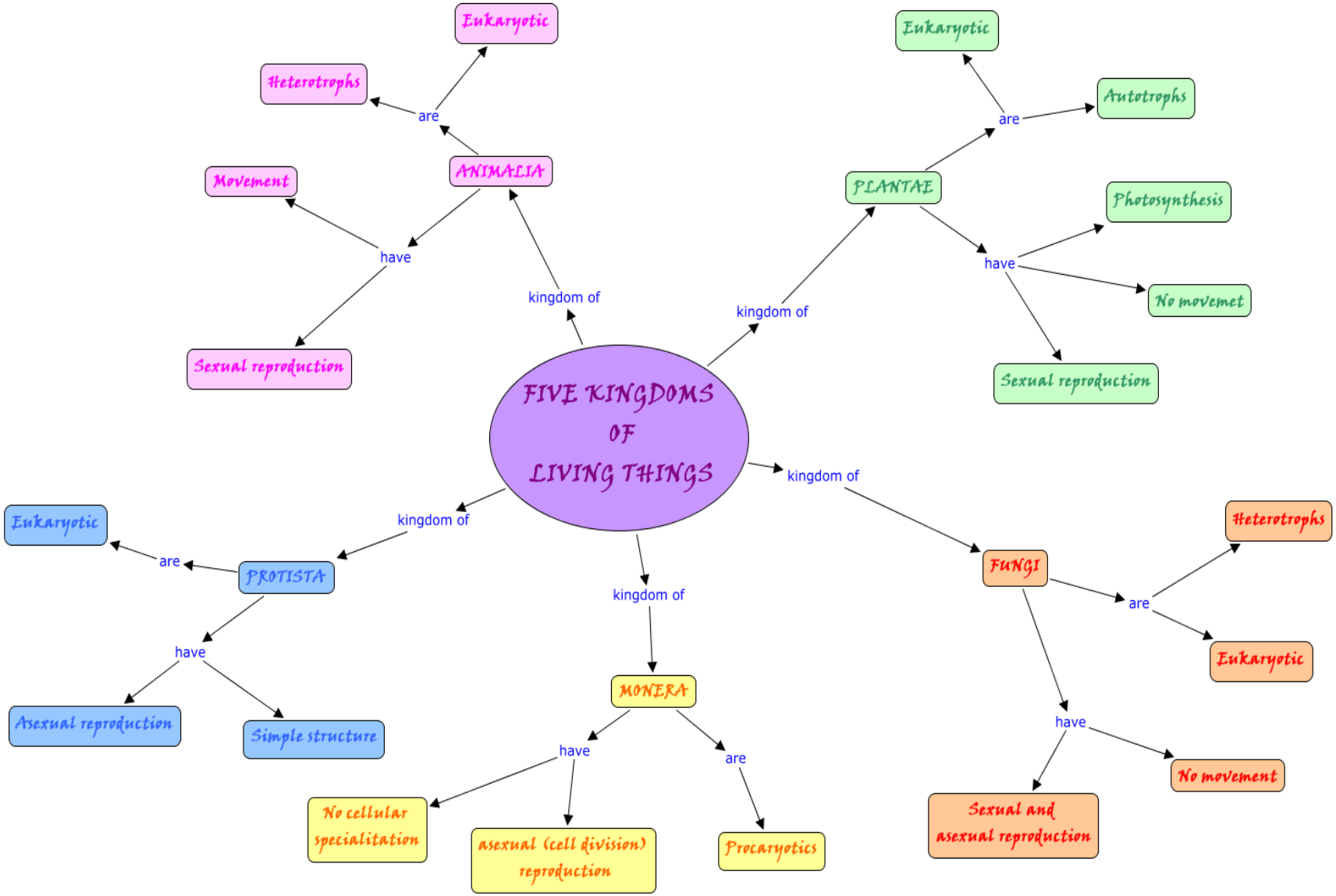


Figure 5: Living things Kingdoms map

Activity 7: Investigation: Biodiversity Loss

- *Intelligence:* Naturalistic intelligence / Intrapersonal intelligence
- *Didactic objective:* Learn and investigate about the causes of the Biodiversity loss.
- *Development:*

After explaining the importance of the five Kingdoms for the life in the Earth, the teacher would ask the students to investigate about the causes of the Biodiversity loss. They would use the computers room and work individually.

Activity 8: Graphic

- *Intelligence:* Visual-spatial intelligence / Logical-mathematical intelligence
- *Didactic objective*: Extract the main information and learn how to do a graphic.
- *Development*:

With the information of the Activity 8 children would work in five groups to create a graphic with the main causes of Biodiversity loss.

Activity 9: Biodiversity Loss Rap

- *Intelligence*: Musical intelligence / Interpersonal intelligence
- *Didactic objective*: Learn the main ideas of the Biodiversity loss using the music and their imagination.
- *Development*:

With the help of the teacher, the students would create a rap song with the most important actions to care the Biodiversity.

Activity 10: Rap Choreography

- *Intelligence:* Corporal-kinesthetic intelligence / Interpersonal intelligence
- *Didactic objective*: Use their body language to express ideas
- *Development*:

Once students have done their rap song, they would create choreography to perform it and express with their body the main ideas of the song. The teacher should help and support them.

Activity 11: Living Things Book

- *Intelligence:* linguistic intelligence / Interpersonal intelligence
- *Didactic objective*: Summarize and reorganize the main ideas of the topic.
- *Development*:

"Now that we have finished our investigation of the Kingdoms of Living Things, we are going to create some books with all the information. If we do this and put them in our library, Geronimo would have all the information for his investigation ordered and classified".

With this activity the teacher would assess the students about their knowledge of the topic. The teacher should have observations of the other activities to take into account too. Students would work in groups to create a book (one for each group) of the five Living Things Kingdoms with different examples, illustrations and the most important clues for their conservation. These books would be able to be read in the class library or in the school library.

Activity 12: Self Assessment

- *Intelligence*: Intrapersonal assessment
- *Didactic objective*: Think about their learning.
- *Development*:

The teacher would ask the students to write a letter, individually, to Geronimo in order to tell him what they have discovered about this topic and ask him if they have any doubts or if they want to know more things about the topic.

CONCLUSIONS (SPANISH)

La conclusión principal que extraigo de este trabajo sería la necesidad de una revisión de lo que tradicionalmente se entiende por inteligencia, ya que este concepto ha variado mucho gracias a los estudios que se han ido desarrollando sobre ella en los dos últimos siglos. Con este trabajo queda claro que la inteligencia no es una entidad única que se tiene o no se tiene desde el momento de nacer, sino que es una parte de nuestra mente formada por distintas secciones que potencialmente se pueden desarrollar y entrenar si se obtiene la necesaria estimulación para ello.

Por esta razón la teoría de las Inteligencias Múltiples encaja a la perfección con esta búsqueda de nuevas metodologías y recursos que hemos comentado en la sección "Introduction" de este documento. Esto se debe principalmente a afirmación que esta teoría propone de la existencia de múltiples inteligencias dentro de un mismo sujeto, con diferentes estados de cognición y distintos desarrollos y posibilidades de desarrollo en cada persona.

El objetivo que tiene la teoría de las inteligencias múltiples es llegar a desarrollar todas las inteligencias por igual, o por lo menos, lograr un desarrollo suficiente en todas ellas, sin dar más importancia a unas u otras. Este punto marca una gran diferencia con las técnicas tradicionales de educación y evaluación, en la que sólo se tenía como importante el desarrollo lingüístico y matemático, siendo el resto de áreas accesorias en la formación del alumno.

El aplicar en la escuela esta teoría psicológica implica grandes cambios tanto metodológicos como de pensamiento, ya que abre una puerta a nuevos caminos en el área de la educación y el currículum, que son totalmente distintos a lo que estamos acostumbrados. Por eso esta metodología exige un gran esfuerzo por parte del centro escolar en general, paciencia y tiempo para poder desarrollarlo de una manera eficiente y comprometida.

Está claro que al no tener unas pautas concretas en cuanto a la aplicación de este método en el aula, se exige un gran esfuerzo por parte del profesor a la hora de crear materiales y desarrollar actividades acordes a esta metodología. Esto requiere tiempo

e implicación, además de que es necesario creer en el funcionamiento de este sistema para poder trabajar con el de manera efectiva.

En estas pocas páginas no se puede abarcar todo lo que el tema que las inteligencias múltiples pueden dar de sí y, al ser un estudio teórico en el que no he tenido oportunidad de llevar a cabo una propuesta didáctica sobre el tema de la diversidad de los seres vivos y la biodiversidad, agradezco mucho haber tenido la oportunidad de vivir una unidad entera diseñada con la metodología de las inteligencias múltiples en mi estancia en los Practicum V y VI, ya que no es lo mismo imaginarlo que vivirlo; no es lo mismo pensar en las dificultades que alguna actividad puede acarrear que ver cómo surgen las dificultades conforme se va trabajando; y en resumen, no es lo mismo la teoría que la realidad.

Basándome en esta experiencia que he mencionado, he desarrollado mi propuesta didáctica, de un modo teórico pero teniendo en cuenta mis vivencias. El tema desarrollado es la diversidad de los seres vivos y la pérdida de biodiversidad. Me parecen dos temas interesantes y muy necesarios de estudiar, ya que conocer la diversidad de los seres vivos y la importancia que estos tienen para la conservación del planeta puede hacer recapacitar a muchos, ya desde la etapa de educación primaria, de la necesidad de cuidar la naturaleza.

Esta reflexión y este cambio de mentalidad con respecto a la naturaleza hay que inculcarlo desde pequeños, por eso me parece de vital importancia el trabajarlo de una manera divertida, con actividades muy distintas, para que a todos los alumnos les llegue esta información con una actividad u otra; es decir, realizar actividades acordes con las distintas inteligencias para que así los alumnos aprendan la importancia de la naturaleza y su cuidado a través de las distintas inteligencias.

Para finalizar he de decir que investigar y trabajar con las inteligencias múltiples va a ser muy útil para mí en mi futuro como docente, ya que no es necesario dar clase en un centro que trabajen las inteligencias múltiples para ser capaz de diseñar actividades variadas que ayuden a aprender a cuantos más alumnos mejor y que además desarrollen su potencialidad al máximo.

REFERENCES

Books

- ARMSTRONG, T. 2006. *Las inteligencias múltiples en el aula. Guía práctica para educadores.* Barcelona: Paidós Ibérica.
- GARDNER, H. 1983. *Frames of Mind: The Theory of Multiple Intelligences.* New York. Basic Books.
- GARDNER, H. 1995. *Inteligencias múltiples: la teoría en la práctica.* Barcelona: Paidós.
- PRIETO SÁNCHEZ, M.D. y FERRÁNDIZ GARCÍA, C. 2001. *Inteligencias Múltiples y Curriculum Escolar*. Málaga. Aljibe.

Webs

- CURRÍCULO NAVARRO DE CONOCIMIENTO DEL MEDIO [Disponible en (21/05/13)]: http://www.educacion.navarra.es/portal/digitalAssets/12/12600_cienciasnat.pdf)
- DECRETO FORAL 24/2007, de 19 de marzo: [Disponible en (21/05/2013)]: http://www.navarra.es/home_es/Actualidad/BON/Boletines/2007/64/Anuncio-0/)

Articles

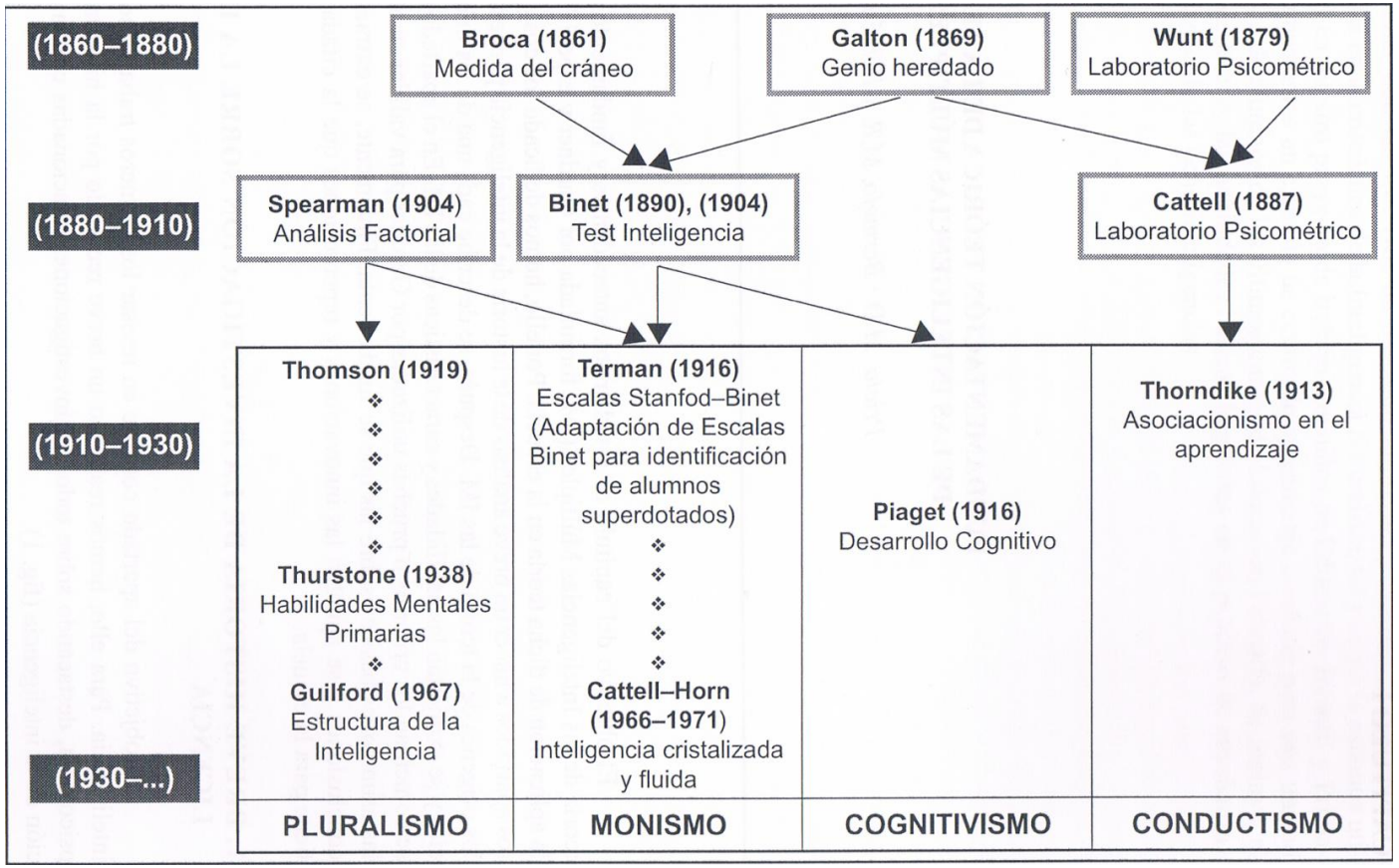
- LA VANGUARDIA DIGITAL: Sir Ken Robinson interview [Disponible en (21/05/13)]: http://www.lavanguardia.com/lacontra/20101103/54063818455/la-creatividad-se-aprende-igual-que-se-aprende-a-leer.html

ANNEXES

A. Annex I

Chart 1: First intelligence theories

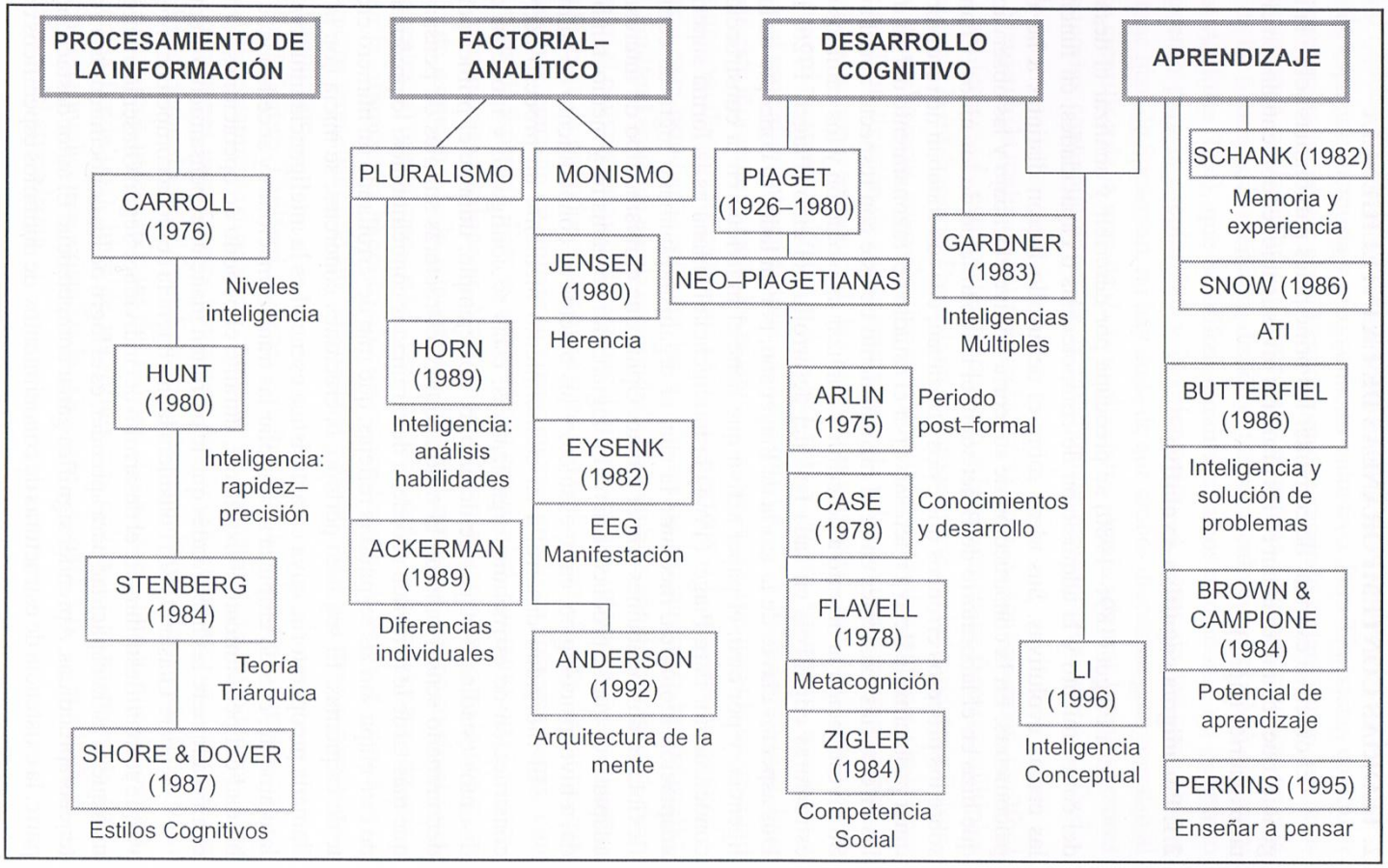
[From PRIETO SÁNCHEZ, M.D. y FERRÁNDIZ GARCÍA, C. 2001. *Inteligencias Múltiples y Curriculum Escolar* (p.16)]



B. Annex II

Chart 2: Contemporary intelligence theories

[From PRIETO SÁNCHEZ, M.D. y FERRÁNDIZ GARCÍA, C. 2001. *Inteligencias Múltiples y Curriculum Escolar* (p.22)]



C. Annex III

Chart 3: Types of intelligence

[From PRIETO SÁNCHEZ, M.D. y FERRÁNDIZ GARCÍA, C. 2001. *Inteligencias Múltiples y Curriculum Escolar* (p.34)]

TIPOS DE INTELIGENCIAS	SISTEMA SÍMBOLICO	RENDIMIENTOS ADULTOS VALORADOS SOCIALMENTE	PATOLOGÍA	LOCALIZACIÓN CEREBRAL	PERSONAS RELEVANTES
LINGÜÍS-TICA	Lenguajes fonéticos	Poetas, novelistas, escritores	Afasia, Dislexia Disfasia	Lóbulos temporal y frontal izquierdos (áreas de Broca y de Wernicke)	Cervantes, Shakespeare, Dante
LÓGICO–MATEMÁ-TICA	Sistema numérico Sistema abstracto	Matemáticos, científicos, cajeros	Síndrome de Gerstmann	Lóbulo parietal izquierdo, hemisferio derecho	Pitágoras, Arquímedes, Blas Pascal
MUSICAL	Sistemas de notaciones musicales	Músicos, compositores	Amusia	Lóbulo temporal derecho	Beethoven, Mozart
VISO–ESPACIAL	Lenguajes ideográficos	Pintores, escultores, marineros, ingenieros, arquitectos	Síndrome de Turner Daños visuales	Regiones posteriores del hemisferio derecho	Picasso, Miguel Ángel, Rafael, Salzillo
CORPORAL	Lenguajes de signos	Cirujanos, bailarines, atletas, artesanos	Apraxia	Cerebelo, ganglios basales, corteza motriz	Martha Graham, Nadia Comanechi, Nacho Duato
INTRA-PERSONAL	Símbolos del yo	Psicólogos, filósofos y líderes religiosos	Incapacidad para expresar sentimientos	Lóbulos frontales y parietales, sistema límbico	Madre Teresa de Calculta
INTER-PERSONAL	Señales sociales (gestos y expres. Faciales)	Líderes políticos, vendedores, profesores	Indiferencia a los sentimientos de los otros	Lóbulos frontales, lóbulo temporal (hemisferio derecho), sistema límbico	Gandhi, Luther King
NATURA-LISTA	Sistema abstracto: Formulación	Biólogos, jardineros, botánicos, físicos y químicos	—	Hemisferio derecho	Madamne Curie, Darwin, Mendel, Einstein, Ramón y Cajal

D. Annex IV

Chart 4: Application of the MI to the school

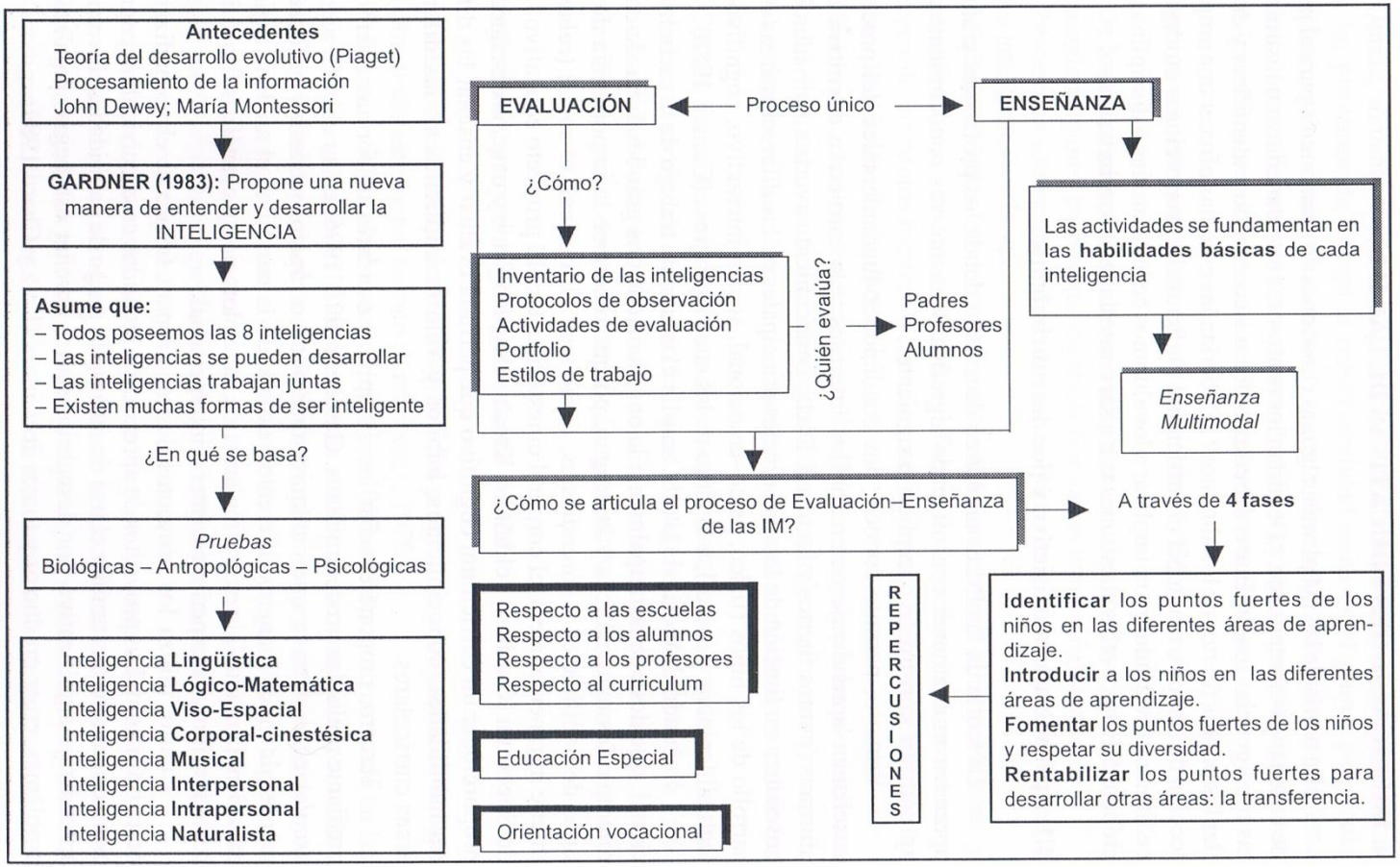
[From PRIETO SÁNCHEZ, M.D. y FERRÁNDIZ GARCÍA, C. 2001. *Inteligencias Múltiples y Curriculum Escolar* (p.44)]

INTELIGENCIA	LES ENCANTA	ACTIVIDADES DE ENSEÑANZA	MATERIALES DE ENSEÑANZA
LINGÜÍSTICA	Pensar con palabras, leer, escribir, contar historias, jugar, etc.	Debates, juegos de palabras, narración de cuentos, lectura oral, escribir diarios, etc.	Libros, grabadoras, máquinas de escribir, ordenador, etc.
LÓGICO–MATEMÁTICA	Utilizar el razonamiento, experimentar, preguntar, resolver rompecabezas lógicos, calcular, etc.	Problemas de ingenio, resolución de problemas, cálculos mentales, juegos con números, etc.	Calculadoras, materiales manipulables, y juegos matemáticos, etc.
ESPACIAL	Pensar con imágenes, diseñar, dibujar, visualizar, garabatear, etc.	Actividades artísticas, juegos de imaginación, mapas mentales, metáforas, visualizaciones, etc.	Gráficos, mapas, vídeo, LEGO, materiales de arte, ilusiones ópticas, cámaras fotográficas, biblioteca de imágenes, etc.
CORPORAL–CINESTÉSICA	Utilizar las sensaciones corporales, bailar, correr, saltar, construir, tocar, gesticular, etc.	Manuales, teatro, danza, deportes, actividades táctiles, ejercicios de relajación, etc.	Herramientas para construir, arcilla, equipo deportivo, materiales y experiencias táctiles, etc.
MUSICAL	Expresarse con ritmos y melodías, cantar, silbar, entonar melodías, llevar el ritmo con los pies o las manos, etc.	Cantar, asistir a conciertos, tocar instrumentos musicales, escuchar música, etc.	Grabadoras, cintas de música, instrumentos musicales, etc.
INTERPERSONAL	Intercambiar ideas con los otros, dirigir, organizar, relacionarse, manipular, mediar, etc.	Aprendizaje cooperativo, tutoría a compañeros, participación en actividades de la comunidad, etc.	Juegos de mesa, materiales y vestuario para el teatro y la dramatización, etc.
INTRAPERSONAL	La autorreflexión, fijarse metas, meditar, soñar, y planificar.	Instrucción individualizada, aprendizaje metacognitivo y actividades de autoestima, etc.	Redacción de diarios y proyectos individuales, etc.
NATURALISTA	Utilizar el razonamiento inductivo–deductivo para experimentar, manipular, e investigar, etc.	Experimentos y análisis de investigaciones, tareas que exijan observar, etc.	Instrumentos para investigar (lupa, microscopio, etc); objetos del mundo natural para observar y analizar.

E. Annex V

Chart 5: MI and school curricula

[From PRIETO SÁNCHEZ, M.D. y FERRÁNDIZ GARCÍA, C. 2001. *Inteligencias Múltiples y Curriculum Escolar* (p.57)]



F. Annex VI

Chart 6: Teaching strategies

[From PRIETO SÁNCHEZ, M.D. y FERRÁNDIZ GARCÍA, C. 2001. *Inteligencias Múltiples y Curriculum Escolar* (p.92)]